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ELEMENTS OF PERFECT ORDER RATE RESEARCH IN LOGISTICS CHAINS

Ilona JACYNA-GOŁDA[1], Michał KŁODAWSKI[2], Konrad LEWCZUK[3], Marcin ŁAJSZCZAK[4], Tomasz CHOJNACKI[5], Teresa SIEDLECKA-WÓJCIKOWSKA[6]

[1, 6]*Warsaw University of Technology, Faculty of Production Engineering, Warsaw, Poland*

[2, 3, 4, 5]*Warsaw University of Technology, Faculty of Transport, Warsaw, Poland*

[5]*ESPERTO Logistic systems designing, Sierpc, Poland*

Abstract:

Perfect order rate (POR) is one of the superior measures of the logistics processes quality. POR is at the top of the hierarchy of key performance indicators (KPI) in supply chain and is considered as difficult to define and measure. Perfect order rate is composed of sub-measures touching technical, economic, quality and safety aspects of logistics processes. POR directly defines what the organization considers to be the perfect implementation of its tasks (and thus sets goals for the organization) and, secondly, measures the degree of achievement of these goals. The paper defines the concept of perfect order rate by including new elements to classic definition, so far rarely considered in the literature: possibility of order implementation according to standard procedures in organization and safety aspects. The concept of logistics chain and the impact of its functioning on the POR value have been defined. The picking and replenishment processes were discussed in detail as the basic elements affecting the quality of logistics processes and the value of POR. Next, the issues of logistic processes safety in warehouse facilities were discussed. The large intensity of warehouse operations along with their mechanization and automation very often leads to many hazards in warehouses and logistics chain. These hazard are usually related with warehouse workers safety. However, they can also lead to various delays or downtime in the material flows, as well as damage or reducing the quality of materials. So it was assumed that safety aspects can influencing the value of POR in the logistics chain. Due to conducted research and compiled reports indicate that many accidents in the warehouse are associated with the forklifts use as equipment for material handling. Therefore, in paper main attention was paid to hazards related with forklifts, warehouse safety speed, etc.

Keywords: *sight distance, decision, stopping, maneuver, speed, decelerartion*

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Contact:

1) jacyna.golda@gmail.com [https://orcid.org/0000-0001-8840-3127], 2) mkloda@wt.pw.edu.pl [https://orcid.org/0000-0002-4256-2189], 3) kle@wt.pw.edu.pl [https://orcid.org/0000-0002-0152-8531]

1. Introduction to perfect order rate in logistics chain

1.1. Elements of perfect order rate

For most logistics businesses high perfect order rate (POR) is the first goal on the list of welcome achievements. Since the time and cost of logistics services are now comparable, the quality of logistics services became one of the most significant criteria to select services provider. The measurement of quality is difficult and multifaceted. It is a thing that can't be simply quantified so we must use descriptive methods or try to by simple and find out how many of our actions are done as it was planned and with no errors, because only that way we can increase the quality.

The Perfect Order Rate is a key performance indicator (KPI) measuring how many orders or other actions you do without any incident and in a way as it was planned. The incidents are damaged goods, inaccurate orders, late shipments or bypassing procedures to keep the client satisfied at all costs. Attaining a high perfect order rate should be the goal of every logistics chain and its elements as it indicates its efficiency and customer satisfaction.

For the purpose of this paper, the perfect order rate is defined as the ration of all orders in a given time completed "perfectly" to the total of number orders reported to the system. The order is considered as perfect when:

- it is received by customer in full, on time and with no errors,
- information and documentation are error-free,
- customer has no reason to doubt the quality of the product or service,
- no mistakes occurred during order realization (no additional labour or effort was necessary to succeed the order),
- the price payed by customer and costs or service provider were acceptable, fixed and didn't change during order realization,
- no hazardous situations happened to the employees, products and employees.
- order was realized under standard procedure in the logistics chain (without any unplanned actions),

These conditions are dependent on many factors in logistics chain, including all its elements, and difficult to meet. This is the difference between classic POR focusing only on client satisfaction. Especially last two elements are not used in POR calculation. The POR presented like that can be named as total and complete. In this paper we will undertake selected aspects of this definition touching subsequent elements of POR.

1.2. POR index

Perfect order rate index measures the share of orders carried out by logistics chain in a way that organization perceives as 'perfect'. The perfect order is the one without delays, incomplete shipments, damaged or low-quality goods, as well as incorrect documentation. Therefore, the POR indicator can be written as follows:

$$\boldsymbol{POR} = \frac{\sum_{i=1}^{n} \omega_i^{PRO}}{n} \cdot 100\% \tag{1}$$

where:

n – total number of completed orders.
i – number of orders.
ω_i^{PRO} – quality indicator of the *i*-th order.

The quality indicator of the *i*-th order implementation is 1 when none of the above-mentioned incidents has occurred during the given order was performed. Accordingly, the quality indicator of the *i*-th order implementation ω_i^{PRO} can be formulated as follow:

$$\forall_{i \in I} \quad \omega_i^{PRO} = DL_i \cdot CM_i \cdot DM_i \cdot QM_i \cdot CD_i \tag{2}$$

where:

DL_i – delay of *i*-th order, if order is delayed then $DL_i = 0$, otherwise $DL_i = 1$.
CM_i – completeness of *i*-th order, if order is complete (contains all ordered articles) then $CM_i = 1$, otherwise $CM_i = 0$.
DM_i – damage of materials sent in *i*-th order, if materials were not damaged then $DM_i = 1$, otherwise $DM_i = 0$.
QM_i – quality of materials sent in *i*-th order, if materials were good quality then $QM_i = 1$, otherwise $QM_i = 0$.
CD_i – correct documentation of *i*-th order, if documentation was correct then $CM_i = 1$ otherwise $CD_i = 0$.

Then equation (1) takes form:

$$\boldsymbol{POR} = \frac{\sum_{i=1}^{n} DL_i \cdot CM_i \cdot DM_i \cdot QM_i \cdot CD_i}{n} \cdot 100\% \qquad (3)$$

Achieving a high quality orders (a high POR value), should be the goal of every logistics organization and its elements. This will affect high organizational efficiency of the chain and a high level of customer satisfaction as well as business and financial success in the supply chain.
The formula (3) shows that a value of the POR index depends on many components. These components usually depend on:

- the quality of the offered goods and services,
- the quality of implemented in SC procedures,
- organization of work a
- skills and experience of employees,
- as well as the technical condition of used logistics equipment.

1.3. Logistics chain and logistics network

In general, logistic chain is a configuration of logistics and economic bodies working under chained financial, information and material flows (Jacyna-Gołda 2012, 2013). When the concept of logistics chain is enriched with assumption of long term co-operation, wide range correlated supply structure, strong production dependencies and business interactions for a specific economic branch, it can identified as a logistic network.
The concept of network defined as (Cecere 2012, Rushton et al. 2006, Jacyna-Gołda 2012):

1. a set of interrelated and mutually conditioned activities with designated starting and end points,
2. interrelationships between elements of a specific process presented in form of graph in which arcs reflect processes (operations) and nodes map the moments of start and end of their implementation,

is a base to define logistics network. Logistic network is then a graph-type structure of competing entities carrying material flows from suppliers to recipients, interrelated with other functionally, technologically, economically and by information dependencies. Single logistics network focuses on one businesses and embraces entities depend on the same regulations and economic boundaries which draw the area of their operation. The logistics network (Cecere 2012, Jacyna-Gołda 2012, 2014) is also perceived as a group of independent enterprises competing or cooperating to improve the efficiency of products flow in accordance with the expectations of customers. Żak et al., 2014 use the concept of Business Network in which integration and coordination of business cooperation through the existence of a dominant entity in network is emphasized. In this respect it was assumed that two types of cooperation are possible (Jacyna-Gołda, 2012, 2014; Jacyna et al., 2018a):

1. vertical, between various entities creating a logistics network;
2. horizontal, between entities performing similar function in the network.

Regardless the structure in which logistics chain operates, its assessment is based on satisfaction of final customers. High satisfaction can be achieved by strong network of high capacity facilities, but the economic calculation limits the technical possibilities. Finally the quality of services results from efficient balancing between available technical potential, organization and achieved quality of services.
POR in logistics network is dependent on two basic factors:

1. stock availability for subsequent links,
2. process quality in subsequent links.

Only when supplies are full and sufficient particular bodies in logistics network are able to perform their functions. In turn, the number of errors and the availability of materials in the following chains depend on the quality of work of individual facilities.
Quality of logistics processes is high when final and intermediate consumers demands are satisfied. Satisfying all created demand is, of course, impossible, but extending variety of goods, increasing stocks, placing stock closer to the client and shortening reaction time would for sure increase the quality of services. The POR would reach high values then, but it would also significantly increase the cost making the business unprofitable.

1.4. POR indicators for the evaluation of logistics chains

A fairly wide range of indicators to assess the operation of logistic chains and their elements like warehouses was formulated by Twaróg (2005). Commonly used key performance indicators (KPI) in supply chain management base on time, quality and cost measures. KPIs can be divided into quantitative and qualitative indicators (Jacyna-Gołda 2015b).

Quantitative measures consist of time-based indicators describing material flow realization, physical measures of capacity, number of resources and resulting operation costs. Quality measures embrace reliability of system's operation, flexibility or expansion ability. Quality also is given by structure and number of errors and safety statistics.

The POR is a complex measurement placed at the top of KPI panels. Classic POR must be reconstructed any time it is implemented in logistics chain and fitted to the specific conditions of this chain.

Evaluation parameters constituting POR, answering the question – when order is considered as 'perfect', must be supplemented with weights to balance resulting value of POR. The parameters, measures and quantified rational factors together, subordinated to the evaluation criteria and their weights and hierarchies, form a system of values for the assessment of the system. The value system for POR measure should contain:

- hierarchical panel of technical, economic and quality measurable parameters and methods for their determination,
- assignment of individual parameters to elements of the process of order realization,
- non-measurable factors and methods for their following and description.

To create a panel of measures constituting POR it is necessary to identify those elements of the process which influence the quality. In the following part of the paper we consider two elements of logistics processes constituting POR in most of logistics chains in distribution.

2. Element of warehouse operation in POR

2.1. Warehouse-related factors lowering POR

Warehouse facilities are buffer subsystems placed at the entrance and exit of all logistics chains. This supports the stabilization of production and distribution processes and maintaining continuity of processes. Tasks and responsibility of warehouse facilities result from their position in logistics chains. Warehouses can be located in the area of supply, distribution or fulfill functions of operating warehouses in production systems. In all cases warehouses are logistics chain fuses securing material flow continuity in case of flow accumulation and temporary lack of materials (Jacyna-Gołda et al., 2015, 2018).

For most logistics businesses serving the final consumers an order is deemed perfect if it is shipped from warehouse on time, contains the right, not damaged items, and doesn't trigger a return. These factors are subordinated to major requirement of no negative financial events (Novack and Thomas, 2004).

Any warehouse process can be divided into two main phases – receiving (filling the warehouse) and shipment (emptying the warehouse). Typically, these processes are differently organized and planned, and are only indirectly linked by long-term structure of demand (Kłodawski et al. 2017a). In case of distribution warehouses, especially those located downstream supply chain, the recipient of materials is usually decisive party when it comes to assessing the process quality. The number of material recipients usually significantly exceeds the number of suppliers. This makes picking and dispatching processes crucial to maintaining high POR. The warehouse-related factors lowering POR value in supply chain are usually three:

1. Material is out-of-stock when ordered.
2. Picking errors or damages to the material resulting from inadequate work organization.
3. Insufficient handling potential influencing timeliness of shipments.

The first factor is not directly related to warehouse work organization or handling and storage technologies (Jacyna-Gołda and Lewczuk 2017). Lack of materials for shipments will most often result from inadequate demand forecasting and supply chain planning or objective, unpredictable phenomena in supply chain affecting supply, demand and flow. There can be two reasons related to the warehouse itself: lack of storage capacity which keeps materials upstream and delays material flow or defective inventory control mechanisms introducing erroneous data into the inventory planning mechanisms.

Qualitative or quantitative errors in shipment have different causes, but general rule is that the higher the human factor, the greater the chance for error. Reasons for that are mainly organizational and often associated with haste, which is a consequence of lack of processing capacity. The ability to detect errors before sending materials to the customer requires additional resources involved into control processes. Detection of an error itself will also generate additional actions related to its repair. Thus, counteracting errors is the basic way to increase warehouse efficiency.

The third factor – insufficient handling potential influencing timeliness of shipments, is the basic cause of delays (Jacyna et al. 2015, Lewczuk 2016), and thus also the reduction of POR. Insufficient space (storage capacity) and human and handling resources will cause a delay in delivery, which will affect the POR on-time component. This situation also indirectly causes employees to hurry, which can negatively affect the error-free component.

Jacyna-Gołda and Lewczuk (2017) proposed $OTIFEF_{in}$ and $OTIFEF_{out}$ indexes to describe quality of warehouse service. These indexes share fundamental components with POR in supply chain. $OTIFEF_{out}$ describing quality of output material stream is defined as follows:

$$OTIFEF_{out} = P_{OTout} \cdot P_{IFout} \cdot P_{EFout} \quad (4)$$

where:

P_{OTout} – probability of handling all (daily) shipments on-time,

P_{IFout} – probability of handling all (daily) shipments in-full,

P_{EFout} – probability of handling all (daily) shipments with no errors.

Above probabilities are considered as independent. This can result in underestimation of warehouse dependability but is acceptable when are used for comparing technical and organizational variants.

In-full and error-free components are difficult to calculate without in-depth analysis of historical data, and depend on supply chain planning quality. However, the on-time component affecting external transport planning and other processes in supply chain seems to be crucial for POR and must be discussed separately.

2.2. Shipments strategies and on-time POR component

As it was stated in previous point, shipment process timeliness significantly affects POR in downstream supply chain warehouses. At the same time, these processes are considered as cost drivers consuming space and up to 70% of operation costs (Lewczuk 2012, 2015).

Shipment processes are composed of different types of standard actions, but usually are the sequence of picking, replenishment, sorting and consolidation processes fastened into *shipment strategy* implemented under different manual and automatic warehouse technologies (Kłodawski et al. 2017a, 2017b).

Figure 1 presents general order completion process preceding loading and shipment, typical for most distributional warehouses. It can be performed under different strategies, but all of them (cross-docking and value adding services are not considered) can be included into one of the four groups:

1. Retrieval from reserve areas
2. Picking from areas with fixed picking locations
3. Picking from areas with dynamic assignment of materials to locations (up to order)
4. Picking from material-to-man systems.

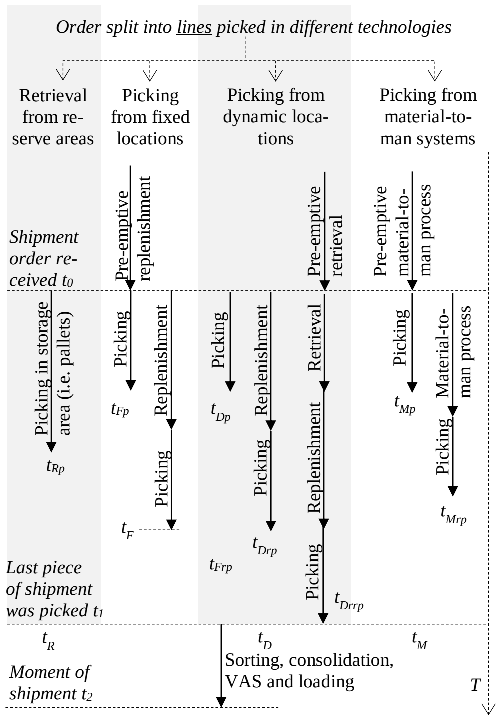

Fig. 1. General order completion and shipment process (own research).

These four strategies can be mixed into simple or wave-picking systems and use supporting mechanisms like batch-picking or multi-order picking, but these are only modifications of the general approach presented here.

Every customer order consisting of several products (sc. picking lines) is usually split due to type of product and quantity into parts picked from particular warehouse areas subjected to four strategies listed above. Strategies offer different productivity and costs and require different process components (Fig. 1) to fulfil the order. Some of them are space consumptive (i.e. fixed locations), but offer high probability of immediate picking, while other save space in place of laborious handling (i.e. dynamic location areas). Other can be fast and space saving, but expensive (i.e. material-to-man). Decision about productivity of particular strategies and their share in shipment realization is a result of (Lewczuk et al., 2013, Jacyna et al., 2015):

1. Initial design of technology, layout and fixed handling resources.
2. Operational reassignment of handling resources (people and equipment) between tasks in real time to balance work.

Parallel work in particular areas realizing different strategies must be balanced to keep the shipment time as short as possible and, what is more important, predictable and constant. Constant time of order completion ($t_1 - t_0$ at Fig. 1) is a condition for expedient level of on-time POR component. POR quality components are more dependent on planning in supply chain and work organization.

Of course, solutions used in individual warehouses result from requirements of individual supply chains and specificity of these chains, characteristics of materials moved and customers' requirements. Nevertheless, presented rules are universal.

2.3. Balancing order-completion time

In order to evaluate P_{OTout} component presented in previous point and balance total order completion time the relation between resources put into strategy realization and number of order lines picked in that strategy should be found.

Resources (space, people and equipment) put into area realizing subsequent strategy will increase plausibility of immediate picking in that area (Fig. 1), but will cost more. Higher plausibility of immediate picking requires significant stock gathered in that area and productive handling system. Distribution of resources will then influence the total order realization time t_1 defined as follows:

$$t_1 = \max\{\, \mathrm{E}(T_R,(R_{IR}+X_R)), \mathrm{E}(T_F,(R_{IF}+X_F)), \mathrm{E}(T_D,(R_{ID}+X_D)), \mathrm{E}(T_M,(R_{IM}+X_M))\} \quad (5)$$

where:

$\mathrm{E}(T_R,(R_{IR}+X_R))$ – expected time of picking materials from reserve areas when fixed resources R_{IR} are installed there and additional resources X_R are assigned,

$\mathrm{E}(T_F,(R_{IF}+X_F))$ – expected time of picking materials from fixed location areas when fixed resources R_{IF} are installed there and additional resources X_F are assigned,

$\mathrm{E}(T_D,(R_{ID}+X_D))$ – expected time of picking materials from dynamic location areas when fixed resources R_{ID} are installed there and additional resources X_D are assigned,

$\mathrm{E}(T_M,(R_{IM}+X_M))$ – expected time of picking materials from material-to-man areas when fixed resources R_{IM} are installed there and additional resources X_M are assigned.

Fixed resources are those which were planned and acquired in designing stage and can't be moved without significant financial effort. Additional resources are those which can be moved freely between the areas (strategies) to balance work and keep total realization time predictable and constant.

Additional resources, together with installed resources are constituting the handling potential of the warehouse and generate corresponding operational costs:

$$R = R_{IR}+X_R+R_{IF}+X_F+R_{ID}+X_D+R_{IM}+X_M \quad (6)$$

Then two tangled criteria function can be formulated:

$$t_1 - t_0 \longrightarrow \mathrm{const} \quad (7)$$

and

$$R \longrightarrow \min \quad (8)$$

Advances in both information technology and the practice of logistics operational decision making have enabled implementing perfect order measurement. Measuring POR in warehouse requires coordination across a variety of functional areas and strategies. The result achieved in warehouse will influence in straight way the POR in whole supply chain.

3. Safety aspects in POR

3.1. Warehouse safety as an element of POR

Additional important factor composing POR is work safety in logistics chain. This factor is not taken into consideration as a typical part of POR. 'Perfectness' of logistics process requires also this aspect to be included. The lack of adequate safety level in any facility can lead to accidents and collisions. These, in turn, are very often causes of goods damage as well as delay in fulfilling customer orders. Therefore, it can be assumed that at least two of the five components of the order quality indicator ω_i^{PRO} are related to safety aspects in the system (DL_i and DM_i). Therefore, these aspects can be included in quality indicator. So the quality indicator of the *i*-th order implementation ω_i^{PRO} can be formulated as follow:

$$\forall_{i \in I} \quad \omega_i^{PRO} = DL_i \cdot CM_i \cdot DM_i \cdot QM_i \cdot CD_i \cdot SI_i \qquad (9)$$

where:

SI_i – safety issues in *i*-th order, if safety issues occurred then $SI_i = 0$, otherwise $SI_i = 1$.

Then equation (1) takes form:

$$\boldsymbol{POR} = \frac{\sum_{i=1}^{n} DL_i \cdot CM_i \cdot DM_i \cdot QM_i \cdot CD_i \cdot SI_i}{n} \cdot 100\% \qquad (10)$$

3.2. Warehouse forklift accidents as POR lowering factors

Currently, the widely developed market of logistics services is characterized by the fact that supply chains and logistics facilities must meet the requirements of regular and intensive order processing. Quick implementation of a large number of orders and related to them warehouse tasks often requires the use of a large number of internal transport means. Ubiquitous trend to reduce the storage space (due to reduction of the business operations costs) causes that on small areas of warehouse, full of goods, equipment and employees, work a lot of internal transport means. This significantly increases the hazards and risks in logistic facilities. (Kłodawski, 2018).

Conducted research and compiled reports indicate that many accidents in the warehouse is associated with the use of forklifts as equipment for material handling. The presence of few forklifts as well as other warehouse workers in the same areas can lead to various types of collisions, hazards and accidents. Additionally, if more than one forklift takes part in the implementation of a given phase of the warehouse process, the phenomenon of congestion may occur. It, in turn, increase delays, downtime, forklift operators nervousness, distraction, and significantly increases the probability of collisions, deductions, employee injuries and material damage.

Causes of accidents related to internal transport means can be divided into few following groups (UDT. Dozór Techniczny 2000-2011):

- design / construction errors - these include various types of constructional defects of the device, drive system, control, electrical, hydraulic and pneumatic installation, improper selection of dimensions and materials, improper protection of the device;
- production defect (production - manufacturing, assembly) - incl. connection defects, plastic processing defects and heat treatment, failure to keep the technical and operational documentation / instructions for use when assembling the device;
- material causes - including hidden material defects, material fatigue, deterioration of material properties during operation, impact of caustic substances or corrosion;
- operating/exploitation errors - incl. improper maintenance and inspection of the device and its safety systems, improper repairs and alterations, malfunctioning of safety devices, improper organization of the workplace, failure to keep technical and operational documentation in operation of the device, inadequate qualifications of service technicians;
- external factors - in this group we distinguish natural disasters, fire, flooding;
- so-called. unexplained causes.

According to statistics of the Occupational Safety and Health Administration in the USA (OSHA - www.osha.gov), it is estimated that all forklifts working in the US each year contribute to more than 100,000 accidents, resulting in up to 94,950 injuries to warehouse workers. Additionally, almost 80% of forklift accidents take place with the participation of a pedestrian (How Automation Technologies Improve Operating Efficiency and Reduce Collisions on Manned Forklifts, SICK, Inc, www.sickusa.com). The main causes of accidents involving forklifts include (Safety Code for Forklift Truck Operators, 1986):

- lack of operator's knowledge or skills,
- operator inattention,
- operator bravado,
- poor technical condition of forklift,

- mechanical defect of forklift,
- structural defect of any part of the forklift.

Furthermore, in OSHA reports it is noticed that 70% of all forklift accidents could be avoided by standardizing operator training procedures as well as safety procedures.

Safety of work (driving) of forklifts in a warehouse is determined by many factors, such as: visibility while driving, technical condition of the vehicle (especially tires), condition and cleanliness of the floor, traffic organization and control, collective safety solutions separating pedestrian traffic from wheeled traffic and increasing visibility and the most important factor, which is allowed driving speed (Horberry, T et al. 2018, Safety code for forklift truck operators 1986). The speed of driving, in conjunction with factors such as operator's fatigue, rush, driving skills, age and routine, as well as those mentioned above, determines the safety of driving. Rush, inattention and poor work organization are the most frequently mentioned causes of potentially dangerous accidents and events involving forklifts. These reasons can be eliminated by the infrastructure manager and entities responsible for organizing work (Jacyna et al., 2018b).

The basic safety factor is proper speed control.

The speed of a forklift truck in logistics facility is one of the basic factor influencing the efficiency of the warehouse system and work safety in it (Jacyna-Goład, Lewczuk 2017, Jacyna, Lewczuk, Jachimowski 2016, Forklift safety – reducing the risks 2010). Admittedly, the high speed and resulting faster movement of forklifts can shorten the time of material handling tasks. Nevertheless, from the excessive moving speed result also many dangerous situations and hazard in warehouses. It should also be also noticed that the forklift speed affects its braking distance length. As the speed increases, the braking distance increases (see Fig. 2).

In order to avoid potential collisions, the forklift should move at such a speed that the stopping distance of it is no greater than the distance between the forklift and the obstacle (e.g. person or other forklift) appearing in its path. At the same time, braking performance should be such that there is no loss of stability of the truck or falling of the transported load (OSHA 2003)

For this purpose, manufacturers use technological solutions like automatic speed reducers controlled globally or depending on the load or the working area of the truck (eg via GPS or RFiD tags). Curve control systems with raised load and anti-jerk systems in combination with quality tires (and well-maintained surface!) reduce the risk of the truck tipping over and shorten the braking distance (Jacyna et al., 2018b).

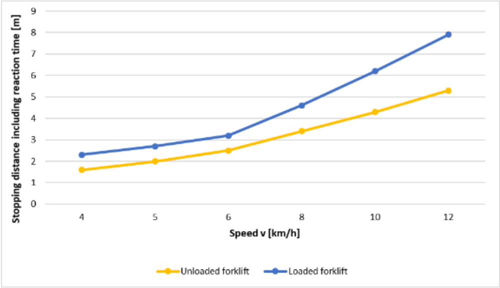

Fig. 2. Stopping distance of the medium-sized loaded forklift as a function of speed in optimal conditions (Saulewicz et al.,2012).

According to the White Paper "Towards Improved Forklift Safety", forklift trucks drivers usually drive at the highest available speeds without load, which is also confirmed by practical observations (Jacyna-Goład, Lewczuk 2017). Operators are subjected to time pressure and at some point fall into routine and overestimate their skills. The Central Institute for Labour Protection (Poland) in 2013 conducted simulation studies of drivers' behaviour in collision-prone situations with a pedestrian, taking into account different speeds without load. The driver's reaction time depends not only on the operator's individual characteristics, current predispositions, but also on so called time of risk. Time of risk is the time that the driver has from the moment the obstacle appears on the truck's path to the moment of collision with (Saulewicz et al., 2012).

In general, the length of the stopping distance depends on the following factors (Jacyna et al., 2018b):

- speed at which the truck moves,
- driver's reaction time,
- weight of the truck and the weight of the load,
- type and condition of tires,
- type, condition and inclination of the road surface.

4. Conclusions

Perfect order rate, like return of investment, is on the top of hierarchy of key performance indicators. It makes it the most important but also the most complex measurements to set and measure. This it quite a challenge to use it properly and fully since the number of POR components is significant and those components touch different aspects of logistics process realization.

The first problem is to answer: what does "perfect" mean and who finds the order was perfect or not. The simplest definitions of POR relate to single-criterion quality measurements like timeliness, fullness or faultlessness. More complicated definitions include also cost factors and information processing. The approach stated in this paper includes also safety and compliance with established standard logistics processes. The perfection of order realization must be followed not only by final recipient, but also in intermediate links of supply chain and at all stages of logistics process. The order that is perfect for recipient could be difficult to implement, labour-intensive and non-standard cost-intensive task. This is not perfect order for service provider. Also the potential risk of health or life threat that could appear during realization is not desirable. Perfect realization must be always safe realization.

Perfect order is forged in whole supply chain – when initial order is analysed and prepared to be realized, when materials are ordered and flow through the system, and in nodal elements of supply chain – when main quality-related actions are undertaken. POR should always be followed

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